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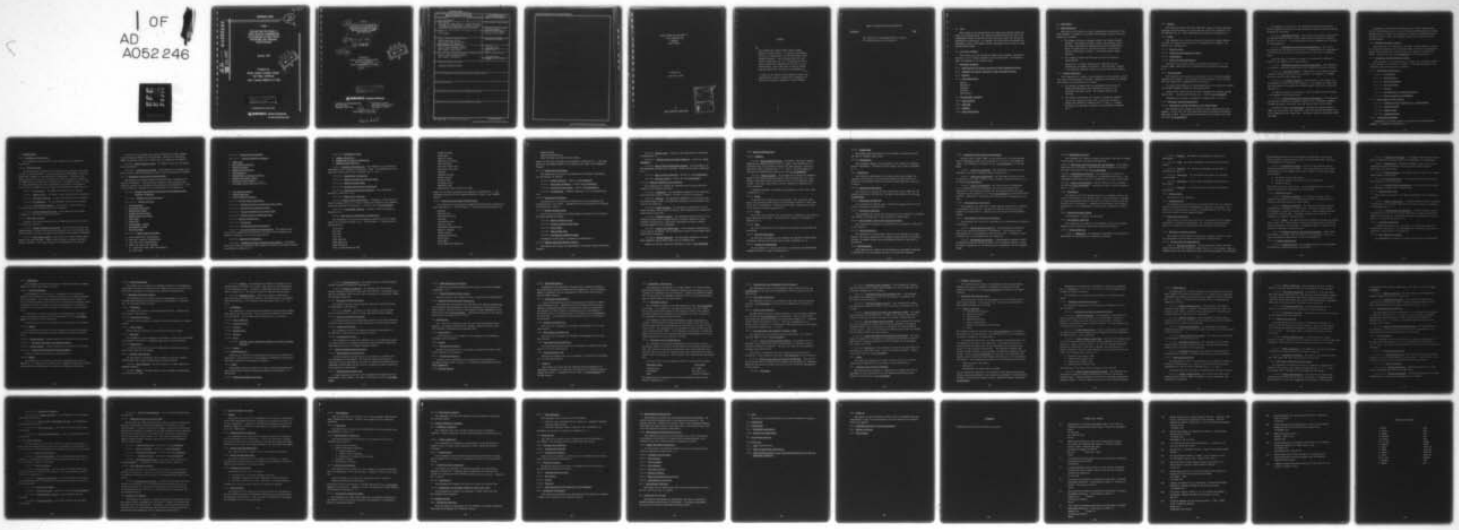

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OUTLINE FOR THE PHASE II JOINT TACTICAL INFORMATION DISTRIBUTION SYSTEM (JTIDS) SHIPBOARD EDM TERMINAL SPECIFICATION

January 1978

Prepared for

NAVAL OCEAN SYSTEMS CENTER
San Diego, California

Under Contract N00123-73-C-1698

Publication W78-1616-TN01

ARINC RESEARCH CORPORATION
P.O. Box 1375/Santa Ana, Calif.

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DRAFT OUTLINE FOR THE PHASE II JTIDS SHIPBOARD EDM TERMINAL SPECIFICATION

Prepared for

Code 8152 of NOSC

by

ARINC RESEARCH CORPORATION

FOREWORD

This document was prepared under contract Number N00123-73-C-1698, Task 35. It contains a preliminary outline of a specification for the JTIDS Phase II EDM Shipboard Terminal. Also contained herein for each section, subsection, etc., is a description of the required contents and information on the source of the required data. Those areas where no data or sources have been identified, will have to be determined.

A listing of the sources of data needed to prepare the specification, as well as those used in preparing the outline are provided in Appendix A of this document.

TABLE OF CONTENTS FOR THE SPECIFICATION

Paragraph Page

The contents will be prepared after all sections and subsections have been identified.

1.0 SCOPE

This section of the specification will clearly and concisely define the scope of the specification. The information presented should be brief, but comprehensive enough to describe the specification in terms that are easily interpreted by contractors. For example, this specification establishes the performance, design, development and test requirements for the Phase II JTIDS shipboard EDM terminal.

2.0 APPLICABLE DOCUMENTS

This section will list by name and number those documents referenced in Sections 3, 4 and 5 and the appendix of this specification. The documents shall be presented in the following order.

2.1 Government Documents

2.1.1 Specifications for Federal, Military or Other Government Activity

2.1.2 Standards for Federal, Military or Other Government Activity

2.1.3 Drawings

2.1.4 Other Publications

Manuals
Regulations
Handbooks
Bulletins
Instructions

2.2 Non-Government Documents

2.2.1 Specifications

2.2.2 Standards

2.2.3 Drawings

2.2.4 Other Publications

3.0 REQUIREMENTS

3.1 System Definition

This section will address the overall capabilities and functions of the JTIDS terminal. An example of the format and information content to be presented are as follows:

a. The terminal consists of hardware elements and computer program software. The terminal provides a secure, jam resistant, multiple access, high-capacity information distribution capability by means of transmitting into and receiving from a time division digital radio broadcast network. The terminal employs spread spectrum. . .

b. The terminal performs functions such as relative navigation, identification. . .

Reference No. 2 provides details on the functions that the terminal will be capable of providing. Other functions, referred to as subscriber functions, have not yet been specifically defined.

3.1.1 General Description

This subsection will contain a brief description of the terminal, including a list of the functions it provides. Examples of the format and information content to be presented are as follows:

a. The terminal processes data into encrypted error protected AJ spread spectrum signals, and translates the signals to RF frequencies and power levels. The terminal transmits and receives. . .

b. The terminal architecture will consist of functional elements such as the terminal processor unit, the RF power amplifier,... Details are presented in Reference Nos. 5, 6 and 7. A general description of the Phase II system is also provided in Reference No. 2.

3.1.2 Mission

This subsection should state that JTIDS will support the joint operations presented in JCS Publication 12 and the missions of the Navy presented in the JOR (Reference No. 3). These requirements are presented in Reference No. 2.

3.1.3 Threat

This subsection will define the threat and the specific jammer capabilities that the terminal shall encounter in an operational environment. The threats to be considered are:

3.1.3.1 Physical Threat

3.1.3.2 Electronic Countermeasures (Jamming)

3.1.3.3 Eavesdropping

3.1.3.4 Signal Intercept Exploitation

Information on the above threats is provided in Reference No. 2. The specific jammer capabilities for the ECM threat are presented in Reference No. 9.

3.1.4 System Diagrams

This subsection will consist of a description of the functional elements comprising the terminal. This information can be presented in block diagram form with descriptions accompanying each as required.

One figure should display the interrelationships of the functional elements of the JTIDS shipboard terminal in block diagram form.

Another figure should display the JTIDS interfaces with external systems such as NTDS and any other systems (e.g.: CAINS) "to be determined".

Information on the above is presented in Reference Nos. 5, 6 and 7.

3.1.5 Functional Interface Requirements

3.1.5.1 Description of JTIDS Interface(s) with Other Systems

This subsection will address the subject of JTIDS interfaces with other systems. At this time, the only system identified to interface with JTIDS on board ship is NTDS. Other shipboard systems which will interface with JTIDS will have "to be determined".

For purposes of this outline, the information presented below for the NTDS is considered illustrative of the format and information contents required to define all interfaces.

3.1.5.1.1 JTIDS/NTDS Interface. This section will provide a figure showing the NTDS/JTIDS interface in block diagram form including all equipments for Link 11 and Link 4. A brief description of which equipments are connected is also appropriate.

3.1.5.1.2 JTIDS/NTDS Electrical Interface Requirement. This section will specify that all signal levels will be in compliance with the requirements of MIL-STD-1397 and present the characteristics of each signal in complete detail.

Since this data is extensive in scope, it is practical to reference it as part of the appendix to this specification.

3.1.5.1.3 JTIDS/NTDS Functional Interface Requirements. This subsection will present a functional description of the JTIDS/NTDS interface as follows:

3.1.5.1.3.1 *The JTIDS Terminal*. A description of the terminal functions related to the NTDS interface will be presented. For example, the terminal provides a built-in TACAN capability. . .

3.1.5.1.3.1.1 Terminal Interface. Each interface to the terminal will be described in terms of functional capability. For example, the JTIDS interface unit between the terminal and the NTDS computer (AN UYK-20) performs the functions of. . .

The above information is extensive in scope and might be best referenced in the appendix of this specification.

3.1.5.1.4 JTIDS/NTDS Mechanical Interface Requirements. This subsection will specify the physical interfaces required for the JTIDS/NTDS equipments. Included are cables, connectors, and other devices such as line drivers.

Details will have "to be determined" concerning the maximum length of cable, the line drivers, and connectors. MIL-C-915 provides information relative to cabling and line capacitance. MIL-M-81511 specifies acceptable connector types.

Information on the NTDS/JTIDS interface can be found in Reference Nos. 18 and 19 while Reference Nos. 5, 6 and 7 describe the ADM terminal interface characteristics. In addition, Reference No. 1 specifies requirements for the interface of Voice, TACAN, IFF transponder, Operator, and digital data for the ADM terminal.

3.1.6 Government Furnished Property

This subsection will identify the Government furnished property, such as the encryption components, which the system shall be designed to incorporate. Details should be provided on nomenclature, part number, or specification number. The GFE will have "to be determined" for this specification.

3.1.7 Operational and Organizational Concepts

This subsection of the specification is normally not applicable, however, in the event that it is desired to include it in the EDM specification, the information given below should be considered.

3.1.7.1 Operational Considerations

3.1.7.1.1 AJ Protection

3.1.7.1.2 System Capacity

3.1.7.1.3 Relative Navigation

3.1.7.1.4 Area of Coverage

3.1.7.1.5 Security

3.1.7.1.6 Low Probability of Signal Exploitation

3.1.7.1.7 Netting Concepts (Net Management)

3.1.7.2 Relationship to Other Systems

3.1.7.2.1 Command and Control Systems (e.g.: NTDS and ATDS)

3.1.7.2.2 Aircraft Systems

3.1.7.2.3 Weapon Systems

3.1.7.2.4 Shipboard Systems

3.1.7.3 Anticipated Deployment

Information on the above subjects for Operational and Organizational concepts is presented in Reference No. 2.

3.2 Characteristics

3.2.1 Performance Characteristics

The performance characteristics of the terminal will be presented in this section.

3.2.1.1 System Structure

The architectural structure of the terminal will be defined in this subsection of the specification. The Navy considers the DTDMA design as the most appropriate candidate for satisfying their requirements. Therefore, this system concept will serve as the baseline for this specification. Details on the DTDMA concept are presented in Reference No. 2 and Reference Nos. 5, 6 and 7. These data sources were used in developing this outline, and should be used to obtain information for each subject area presented in subsection 3.2.1.

3.2.1.1.1 Net Structure. The DTDMA net structure will be defined.

3.2.1.1.2 Number of Nets. The number of nets employed will be identified.

3.2.1.1.3 Multi-Net Structure. The multi-net structure will be defined.

3.2.1.1.4 Net Management. The net management concept will be defined.

3.2.1.1.5 Net and System Capacity. The capacity in kbps of each net, with and without A/J consideration, will be described.

3.2.1.1.6 System Timing and Net Entry. This subsection will present information on the system timing and net entry.

3.2.1.2 Basic Time Intervals

The basic time intervals associated with DTDMA operation will be defined, to include the following:

3.2.1.2.1 Message Transmission Intervals. This section will define the DTDMA messages in terms of diverse lengths distributed over the available time. Specific channel structures are based on operational and interface requirements.

3.2.1.2.2 Basic Event Interval. This section will define channel design based on the pulse concepts. Timing, event intervals, sequences, and other details pertinent to the pulse concept will be presented in this section.

3.2.1.2.2.1 The building block concept using basic and meta channels to form functional channels will be described. Details will include the number of channels, event rates, flexibility, and composition of channels.

3.2.1.2.3 Modular Channel Concept. The channel concept for the system will be presented.

3.2.1.2.3.1 Building Block Concept. This subsection will provide information on such items as Meta-channels, basic channels and functional channels.

3.2.1.3 Transmission and Reception Characteristics

The terminal will perform operations associated with transmission and reception of messages. Although specific details of these operations are limited at present, the information presented below from Reference Nos. 2 and 9 should serve as a guideline for the requirements of this subsection.

3.2.1.3.1 Terminal Characteristics Associated with Transmission and Reception of Messages

3.2.1.3.1.1 Message Structure and Formats

3.2.1.3.1.1.1 Message Structure

a. Pulse Definition
b. User Source Sync Signal
c. Message Start Signal
d. Message Fine Sync Signal
e. Message Source Sync Signal
f. Busy Signal
g. Header Word
h. Data Message - Uncoded
i. Data Message - Coded
j. Net Entry Signal

3.2.1.3.1.2 Message Types and Formats

a. Fixed Format Error Coded Messages
b. Free Text, Non-Error Coded Messages
c. Free Text, Error Coded Messages
d. Round Trip Timing (RTT) Messages
   d1. Round Trip Timing (RTT) Interrogation
   d2. RTT reply

3.2.1.3.1.3 Signal Waveform Synthesis

3.2.1.3.1.3.1 Waveform Synthesis Procedures

a. Header Word
b. Error Detection Encoding
c. Channel Encryption
d. Message Start Generation
e. Data Encryption
f. Forward Error - Correction Encoding
g. Message Start Signal Symbols
h. Message Fine Sync Symbols
i. Data Symbol Spread Spectrum Conversion

j. Data Symbol Encryption
k. Carrier Modulation
l. Carrier Frequency Selection

3.2.1.3.2 RF Power Output Requirements

3.2.1.3.2.1 Maximum Duty Cycle of Required RF Power Output

3.2.1.3.2.2 RF Output Power Reduction Control

3.2.1.3.2.3 Graceful Degradation of RF Power Output

3.2.1.3.2.4 RF Power Output to Mismatched Loads

3.2.1.3.3 Emission Compatibility

3.2.1.3.3.1 RF Spectrum

3.2.1.3.3.2 In-Band Emission Characteristics

3.2.1.3.3.3 Out of Band Emission Characteristics. The emission capability of the system should be defined on the basis of the information presented in subsection 3.3.2 of this specification.

3.2.1.3.4 Transmission Requirements

3.2.1.3.4.1 Transmission Carrier Frequencies and Accuracy. This subsection will include the frequencies and accuracies required for each mode of operation defined in subsection 3.7.

3.2.1.3.4.2 Transmission Timing

a. Transmit Keying Time

b. Compensation of Internal Transmission

c. Blanking Signal Generation

3.2.1.3.5 Reception Characteristics. This subsection will specify the requirements of the terminal for reception of data. The information for the items that follow can be found in Reference Nos. 5, 6 and 7.

3.2.1.3.5.1 Requirements for Reception

3.2.1.3.5.2 Reception Sensitivity and Noise Figure

3.2.1.3.5.3 Reception Dynamic Range

3.2.1.3.5.4 Reception Recovery From Interference

3.2.1.3.5.5 Interference Rejection Capability. This requirement is presented in subsection 3.3.2.

3.2.1.3.5.6 Doppler Shift Tolerance

3.2.1.3.6 Terminal Secure Data Control. Information on this subject is found in Reference Nos. 5, 6, 7 and 9. Details for DTDMA will vary somewhat from those presented in Reference No. 9 and will have "to be determined".

3.2.1.3.6.1 Pseudorandom Sequences. Details on this are provided in Reference No. 2.

3.2.1.4 Pulse Function Transmission Characteristics

This subsection will specify the parameters associated with the transmission for all pulse functions (e.g.: IFF and TACAN). It should include specification of:

Pulse Width
Rise Time
Fall Time
Pulse Top
Pulse Spectrum
Phase Modulation
Phase Transition
Pulse or Group Repetition Rate

Pulses Per Group
Group Width
Spacing in Group
Power Out (at antenna)
Power Variation
Duty Cycle (short term)
Duty Cycle (long term)
Frequency
Frequency Accuracy
Channel Spacing
Switching Time
CW Between Pulses
Mismatched Load
Maximum Power Lower Loss with 2:1 VSWR

Details on the above requirements are presented in Reference No. 1. The information specified for the command terminal will apply to the shipboard terminal.

3.2.1.5 Pulse Function Receiving Characteristics

This subsection will specify the parameters associated with receiving all pulse functions (e.g.: IFF and TACAN). It should include specification of:

Bandwidth
Amplifier Type
CFAR Characteristics
Frequency
Frequency Accuracy
Switching Time
Correlation Characteristics
Number of Channels
Channel Spacing
Threshold Sensitivity
Noise Figure
Input VSWR
One dB Amplitude Compression

Image Rejection

Spurious Characteristics

Local Oscillator and Other Spurious Leakage

Details on the above requirements are presented in Reference No. 1. The information for the Command terminal in the reference will apply to the shipboard terminal.

3.2.1.6 Communications Performance

This subsection will present the communication performance requirements for the terminal, as follows:

3.2.1.6.1 Channel Condition. Details "to be determined".

3.2.1.6.2 Error Rate Performance. Details "to be determined".

3.2.1.6.3 Undetected Error Limits. Details "to be determined".

3.2.1.6.4 AJ Performance. Reference subsection 3.3.2 of this specification.

3.2.1.7 Message Relay Capability

This section(s) will specify the requirement for relay capability and provide details on the subject. Information on the relay operation is provided in Reference Nos. 5 and 9.

3.2.1.8 Terminal Operating Modes

This section will define the different modes of operation of the terminal. The following modes will apply:

3.2.1.8.1 Master Terminal Function

3.2.1.8.2 Polling and Radio Silence Mode

3.2.1.8.3 Polling Mode

3.2.1.8.4 Radio Silence Mode

3.2.1.8.5 Test Message Transmission Mode

Information on these modes is presented in Reference No. 9.

3.2.1.9 Terminal Timing and Position Location

This section will present the requirements for terminal timing and position location.

3.2.1.9.1 Terminal Clock. Details on this requirement are presented in Reference No. 2.

3.2.1.9.1.1 Terminal Timing Oscillator Stability. Details are "to be determined".

3.2.1.9.2 Time of Arrival Measurement Accuracy. The requirements for TOA measurement accuracy will be defined. Details are provided in Reference No. 2.

3.2.1.9.3 Model of Time Corrections. Details are "to be determined".

3.2.1.9.4 Position Location. Details are "to be determined".

3.2.1.10 Detailed Characteristics of Terminal

This subsection will address the characteristics for each functional element of the terminal as follows:

3.2.1.10.1 Transmitter. The performance parameters of the transmitter such as RF power output, frequency, and duty cycle will be presented.

3.2.1.10.2 Receiver. The performance parameters of the receiver such as receiver dynamic range, intermodulation distortion and interference rejection will be presented.

3.2.1.10.3 Signal Processor. The performance characteristics of the signal processor such as signal processing, data transmission and command processing will be presented.

3.2.1.10.4 Terminal Processor. The performance characteristics of the terminal processor such as memory storage, interrupt capability, memory assurance and protection, input/output requirements and power interrupt recovery capability will be presented.

3.2.1.10.5 Control and Display Panel. The performance characteristics of the control and display such as operational controls and performance monitoring will be presented.

3.2.1.10.6 RF Power Amplifier. The performance parameters of the RF power amplifier such as power output will be presented here.

Details on the above functional elements will have "to be determined".

3.2.2 Physical Characteristics

3.2.2.1 Packaging

3.2.2.1.1 Major Equipment Modules. The modules (functional elements) comprising the shipboard terminal will be listed. These modules will include those such as the Terminal Processor and power supplies. Details on this can be found in Reference Nos. 5, 6, 7 and 8. The partitioning configuration for shipboard applications will have "to be determined".

3.2.2.1.2 Packaging Design. This paragraph will address the packaging design of the terminal regarding modules, plug-in construction, etc., and ability to meet MIL-E-16400 requirements as well as being adaptable to MIL-C-24056. This latter specification concerns cabinets for shipboard electronic equipments.

Information regarding the packaging requirements for JTIDS can be found in Reference No. 8.

3.2.2.2 Weight

The weight of the terminal will be specified. The information available on the allowable weight limits for the shipboard terminal, at this time, can be found in Reference 8. Efforts should be made to minimize the weight of the system for shipboard applications.

3.2.2.3 Volume

The volume of the terminal will be specified in accordance to the requirements imposed by MIL-C-24056. The volume of the terminal is discussed in Reference No. 8.

3.2.2.4 Color

The color requirements for the terminal are specified in MIL-E-16400 and FED-STD-595.

3.2.2.5 Mounting Requirements

The mounting requirements for the terminal are specified in MIL-E-16400. Information regarding the mounting can be found in Reference No. 8.

3.2.2.6 Cooling Air Requirements

The requirements for cooling air must be in compliance with MIL-STD-740. Information on this is found in Reference No. 8.

3.2.2.7 Primary Power

The primary power requirements for the terminal are specified in MIL-STD-1399 for shipboard applications.

3.2.2.8 Vulnerability

This paragraph addresses the requirement of the terminal to withstand nuclear environments. Information on this subject can be found in Reference No. 2.

3.2.3 Reliability

The reliability requirements for shipboard electronic equipment are imposed by MIL-R-22732C. The reliability program for JTIDS should be in accordance with MIL-STD-785 and as specified in MIL-STD-454 and include the following:

3.2.3.1 Quantitative Reliability

This section will specify the mean time between failure (MTBF) for the terminal as defined in MIL-STD-781. The MTBF of the terminal will have "to be determined".

3.2.3.2 Reliability Program Plan

This paragraph will specify that a reliability program plan will be prepared in accordance with MIL-STD-785.

3.2.3.3 Reliability Prediction

This paragraph will specify that predictions will be required in accordance with methods of MIL-HDBK-217A to meet conditions of MIL-E-16400.

3.2.3.4 Failure Modes, Effects and Criticality Analysis

This paragraph will present the requirements for performing an FME and CA of the terminal.

3.2.3.5 Failure Definition

The conditions for categorizing a failure in the terminal will be presented. The failure categories will include relevant failures, non-relevant failures, chargeable failures and non-chargeable failures as described in MIL-STD-781.

3.2.4 Maintainability

This subsection will address the maintainability requirement (specified in MIL-STD-454) for the shipboard terminal and include the following:

3.2.4.1 Quantitative Maintainability Requirements

The mean time to repair (MTTR) will be specified for the organizational level of maintenance based upon the existence of a built-in test capability (BITE). The information for MTTR will have "to be determined" from the R&M Plans.

3.2.4.1.1 Corrective Maintenance. The requirement for this will be as specified in the ILSP (Integrated Logistics Support Plan).

3.2.4.1.2 Preventative Maintenance. The requirement for this will be as specified in the ILSP. Details on the frequency, maintenance actions, etc. will have "to be determined".

3.2.4.1.3 Levels of Maintenance. The various levels of maintenance (e.g., organizational and intermediate) will be presented along with a description of the maintenance actions that are associated with each level. Information on maintainability will have to be determined for the shipboard EDM terminal. Reference No. 14 provides some guidelines for consideration in this area.

3.2.4.2 Maintainability Program Plan

This paragraph will state that a Maintainability Program Plan is required in accordance to MIL-STD-470. The plan will describe the tasks to be performed and the procedures for conducting and controlling the maintainability program.

3.2.4.3 Maintainability Prediction and Analysis

This paragraph will specify the requirement for a maintainability prediction and analysis.

3.2.4.3.1 Maintainability Prediction. The maintainability prediction will be done using the procedures of MIL-HDBK-472. This prediction will cover mechanical, electromechanical and electronic parts. Components as well as modules are to be considered for this prediction.

3.2.4.3.2 Maintainability Analysis. A maintainability analysis should be performed along with the design effort for the shipboard terminal in order to permit incorporation of the maintainability requirements into the equipment design.

3.2.4.4 Maintainability Design

This paragraph will address the design requirements that must be imposed on the terminal to ensure suitable maintainability.

3.2.4.4.1 Test Points, Test Facilities, and Test Equipment. These requirements shall be in accordance to MIL-STD-454 and as specified in the ILSP. The above information will have "to be determined".

3.2.4.4.2 Accessibility and Service. This paragraph will address the design of the equipment for accessbility for maintenance and service. The requirement establishing criteria for accessibility is found in MIL-STD-454.

3.2.4.4.3 Built-in Test Equipment. Specific details on the requirement for BITE are "to be determined". Information on BITE is given in Reference Nos. 5, 6, and 7.

3.2.5 Availability

The degree to which the terminal shall be in an operable state at the start of the mission will be specified here. This availability is dependent on supply replenishment factors, and mean time to fault isolate to the LRU and SRU level of maintenance. Information on availability can be found in Reference No. 2. The requirement for availability is defined in MIL-STD-721.

3.2.6 System Effectiveness Models

This subsection is usually not applicable.

3.2.7 Environmental Conditions

This subsection will address the environments in which the shipboard terminal will be required to operate and include the following.

3.2.7.1 Service Conditions

3.2.7.1.1 Temperature. The temperature requirements are specified in MIL-E-16400 for operating and non-operating conditions.

3.2.7.1.2 Humidity. The humidity requirements are specified in MIL-E-16400.

3.2.7.1.3 Shock. The shock requirements are specified in MIL-S-901, Grade A.

3.2.7.1.4 Vibration. The vibration requirements are specified in MIL-STD-167-1, type 1.

3.2.7.1.5 Inclination. The inclination requirements are specified in MIL-E-16400.

3.2.7.1.6 Salt Spray. The salt spray requirements are specified in MIL-E-16400.

3.2.7.1.7 Enclosure. The cabinet shall be drip proof as defined in MIL-STD-108.

3.2.8 Nuclear Control

This section is not applicable.

3.2.9 Transportability

This subsection will specify that the terminal shall meet all conditions specified in MIL-E-17555 for transportability, packaging and storage. All items of the terminal should be capable of transportation by air, rail, ship or surface carriers without subsequent damage.

3.3 Design and Construction

This section will state that each unit of the terminal will be designed to operate in a shipboard configuration, and the design and construction shall be in compliance with MIL-STD-454 and conditions of MIL-E-16400.

3.3.1 Materials, Processes and Parts

This subsection will address all materials, processes and parts to meet the requirements of MIL-E-16400 and include the following areas:

3.3.1.1 Microcircuits and Semiconductors

3.3.1.1.1 Microcircuit Devices. Only microcircuits listed in MIL-STD-1562 and MIL-M-38510 are considered standard devices for the terminal. When non-standard devices are used, these must comply with the requirements of MIL-M-38510.

Non-standard microcircuits must be screened to MIL-STD-883, test methods 5004.2 and 5005.2 including change notice 1 and test method 2018, according to Requirement 64 of MIL-STD-954.

3.3.1.1.2 Semiconductor Devices. Only Jan TX semiconductor devices selected from MIL-STD-701 are standard. When a Jan TX device is not listed, the selection of a non-standard device shall conform to the following order of precedence:

a. Jan device listed in MIL-STD-701
b. Jan device listed in MIL-S-19500, but not MIL-STD-701
c. Commercial device

MIL-S-19500 will govern all devices. All non-standard devices will require a burn-in according to Requirement 30 of MIL-STD-454.

3.3.1.2 Electrical Devices

3.3.1.2.1 Electronic Components. All electronic devices, such as capacitors and resistors, not covered by MIL-S-19500 or MIL-STD-38510 will conform to conditions specified in MIL-E-16400.

3.3.1.2.2 Electrical Connectors. All electrical connectors shall be governed by the requirements of MIL-E-16400. The detailed specification or standard for a specific connector type (e.g.: radio frequency connector) is specified in MIL-E-16400. Information relative to the location of connectors is presented in Reference No. 1.

3.3.1.2.3 Cables. The cables used for the terminal will meet the requirements of MIL-C-915. Specifications covering other cables such as RF coaxial types are specified in MIL-E-16400. Information relative to cabling for the terminal is presented in Reference No. 1.

3.3.1.2.4 Electrical Controls and Corrosion Resistance. Unless otherwise stated, all contacts used in switches, circuit breakers, relays, etc. shall be governed by Requirements 15 and 16 of MIL-STD-454.

3.3.1.3 Processes and Materials

3.3.1.3.1 Protective Finish. All equipment shall meet the requirement for protective finishes specified in MIL-E-16400.

3.3.1.3.2 Fungus Inert Materials. All equipment shall meet the requirements of fungus inert material specified in Requirement 4 of MIL-STD-454.

3.3.1.3.3 Encapsulation. Repairable assemblies (SRUs) are not to be encapsulated, potted or embedded. Any encapsulation shall conform to Requirement 47 of MIL-STD-454.

3.3.1.3.4 Metals and Alloys. The metals and alloys used in the terminal shall conform to MIL-E-16400.

3.3.1.3.5 Soldering Materials. All soldering materials should comply with Requirement 5 of MIL-STD-454.

3.3.1.3.6 Printed Wiring Board Materials. As specified in MIL-E-16400, all PWB materials should comply to MIL-STD-454.

3.3.1.4 Terminal Construction

This section will pertain to the design architecture of the terminal as follows:

3.3.1.4.1 Modular Construction. A general statement should be presented to describe the use of modular construction for ease of repair, replacement, interchangeability, etc.

3.3.1.4.2 Circuit Design and Components. A general statement should be presented to cover the use of solid state devices rather than electronic tubes for circuit design. Information pertaining to guidelines for circuit design is presented in Reference No. 2.

3.3.1.5 Totalizing Time Meters

A totalizing time meter will be used in the terminal that meets the requirements of MIL-M-7793. The requirement for a totalizing time meter is specified in Requirement 51 of MIL-STD-454.

3.3.1.6 Front Panels and Controls.

The requirements for panels and controls are specified in MIL-E-16400.

3.3.2 Interference

This subsection will address the areas of Co-Band Interference, Jamming, TEMPEST and Nuclear Environment as follows.

3.3.2.1 Co-Band Interference

This paragraph(s) will specify the requirement for the terminal to operate within specification limits when subjected to the Co-Band Electromagnetic Environment. The Co-Band Environment specified for the terminal is that of TACAN interrogation and replies, IFF interrogations and replies, JTIDS I messages and JTIDS II messages. These latter messages, are presented in Reference No. 1, and should be referenced in the appendix of this specification.

In addition to the above conditions, the Electromagnetic environment created by shipboard systems such as on-board Radar will have "to be determined" and specified for this subsection.

MIL-STD-461 specifies the requirements for Electromagnetic Interference.

3.3.2.2 Jamming

This paragraph will specify that the terminal will operate within specification limits when subjected to Barrage and Optimum jamming as described below.

3.3.2.2.1 Barrage Jamming. Barrage jamming will be defined in this section.

3.3.2.2.1.1 Functional Performance With Barrage Jamming.

3.3.2.2.2 Optimum Jamming. Optimum jamming will be defined in this section.

3.3.2.2.2.1 Functional Performance With Barrage Jamming.

Details on jamming are presented in Reference No. 1.

3.3.2.3 TEMPEST

The terminal will be designed to meet the requirements and limits of NACSEM-5100. In addition, the terminal will be capable of meeting the requirements specified in MIL-STD-1680 for security of shipboard installations.

3.3.2.4 Nuclear Environment

The terminal will be required to withstand conditions of electromagnetic pulse (EMP) and transit electronic effects (TREE), radiation and thermal blasts. The above electromagnetic requirements are presented in Reference No. 2.

3.3.3 Nameplates and Product Marking

This subsection will state that each prime replaceable unit will be provided with nameplates and marked according to Requirement 67 of MIL-STD-454. The following items will apply:

3.3.3.1 Conformance

All marking will conform to specification MIL-M-13231. Identification will conform to MIL-STD-130.

3.3.3.2 Visibility of Markings

All parts shall be marked in a manner so that the information is readily visible.

3.3.3.3 Serial Numbers

Unless otherwise specified, all parts shall have serial numbers.

3.3.3.4 Nameplates

All equipment will have nameplates in accordance to MIL-M-13231 and marked in accordance to MIL-STD-130. Nameplate types will be per MIL-D-14024C.

3.3.3.5 Abbreviations

In the event that space limits full nomenclature, abbreviations may be used if they conform to MIL-STD-12C.

3.3.3.6 External Cable Marking

The type number or designation will be marked on each cable using an identification tag or band fastened securely around the cable.

3.3.3.6.1 Size of Marking. The major concern is to have legible and permanent markings.

3.3.3.6.2 Method. The major concern is not to impare the characteristic of the wire or cable.

3.3.3.6.3 Location. This paragraph will address the location of the identification on the cable to be within three inches of each junction and at each terminating point. In addition, information should be provided on ease of reading (e.g.: not having to remove to read the identification).

3.3.3.6.4 Unmarkable Cables. Cables that cannot be identified by imprinting shall be identified by means of color coding using a non-metallic sleeve and markings at the termination ends indicating color (e.g.: "Bl", etc.).

3.3.4 Workmanship

This subsection of the specification establishes the acceptable workmanship criteria for the terminal. Areas of concern are defined in Requirement 9 of MIL-STD-454. The following areas should apply for the terminal.

3.3.4.1 Plastic Materials

3.3.4.2 Mounting of Parts

3.3.4.3 Cleaning

3.3.4.4 Threaded Parts

3.3.4.5 Riveting

3.3.4.6 Wiring

3.3.4.6.1 Dressing, Lacing, Anchoring, Insulation, Splicing, Clearance, Shielding

3.3.4.7 Welding

3.3.5 Interchangeability

Mechnical and electrical interchangeability shall be in accordance with Requirement 7 of MIL-STD-454 for like assemblies, subassemblies and replaceable parts regardless of manufacturer or supplier.

3.3.6 Safety

The equipment shall be designed to be safe to operate and maintain and shall comply with the safety requirements presented in Requirement 1 of MIL-STD-454.

3.3.6.1 Voltage and Frequency Transients

3.3.6.1.1 Voltage Transients. The terminal shall be protected against voltage transients as specified in MIL-STD-704.

3.3.6.1.2 Frequency Transients. The terminal shall be protected against frequency transients as specified in MIL-STD-704. The terminal shall meet all performance characteristics after restoration of steady state voltage and frequency conditions.

3.3.6.2 Electrical Overload Protection

The terminal shall be protected against electrical overload according to Requirement 8 of MIL-STD-454.

3.3.6.2.1 Interlock. Interlocks for high voltage will be provided with an indicator (e.g.: lamps) to denote when they have been disabled.

3.3.6.3 Electrical Underload Protection

The terminal shall not be damaged upon exposure to electrical underload, and shall perform satisfactorily upon restoration of normal operating power.

3.3.6.4 Bonding and Grounding

All equipments will meet the bonding and grounding requirements of MIL-STD-1310 for EMI reduction and personnel safety.

3.3.6.5 Overtemperature Sensor

This paragraph will state the requirement for an overtemperature sensor to operate within 5^{o} of maximum permissible internal operating temperature. This sensor will result in automatic equipment turnoff.

3.3.7 Human Performance/Human Engineering

3.3.7.1 Human Engineering Program Plan

A human engineering program plan will be prepared in accordance with the requirements of MIL-H-46855. The plan will include provisions for compliance with the requirements of the Failure Analysis and Drawing approval paragraphs of MIL-H-46855 and the controls, indicators and panel layout sections specified in MIL-E-16400.

3.3.7.2 Human Engineering Test Plans

A human engineering test plan will be prepared in accordance with the requirements of MIL-H-46855. The areas to be tested will have "to be determined".

3.3.7.3 Human Engineering Test Report

A report will be prepared describing the results of the tests performed in paragraph 3.3.7.2.

3.3.7.4 Human Engineering Design Criteria

Design criteria for the terminal will be in accordance with MIL-STD-1472.

3.3.8 Computer Program Design and Construction

This subsection will describe the requirements for computer programs that will be designed and implemented to meet the performance requirements of the JTIDS terminal. Specific details on the computer programs implemented in the terminal will have "to be determined". Information pertaining to this subject can be found in Reference Nos. 5, 6 and 7.

3.4 Documentation

This section will establish a plan for all system documentation that is required. Included are specifications, drawings, technical manuals, plans and procedures, installation and instruction data.

3.4.1 Specifications

A specification will be provided for each component of the terminal in accordance with MIL-STD-490.

3.4.2 Drawings

3.4.2.1 Manufacturing Drawings

Manufacturing drawings shall be provided in accordance with Form 2, MIL-D-1000, Category E and Category F.

3.4.2.2 Installation Drawings

Drawings for the installation of the terminal will be provided in accordance with MIL-D-1000, Category G. Installation requirements will have "to be determined".

3.4.3 Technical Manuals

3.4.3.1 EDM Program Manuals

Information will be developed from design data, drawings, procedures, and provisioning technical documentation and prepared in a type II Technical Manual in accordance with the requirements of MIL-M-15071G and delivered with the OPEVAL terminal.

3.4.3.2 Production Program Manuals

A type II Technical Manual will be prepared and furnished as a camera-ready reproducible copy. Information will be developed from design data, drawings, operational procedures and provisioning technical documentation, and prepared in a Type II Manual in accordance with the requirements of MIL-M-15071G, and in an Overhaul Manual in accordance with the requirements of MIL-M-21742. Both reproducible and manuscript copies will be prepared and furnished.

3.4.4 Reliability Program Plan

This plan will be prepared in accordance with paragraph 3.2.3 of this specification.

3.4.5 Maintainability Program Plan

This plan will be prepared in accordance with paragraph 3.2.4 of this specification.

3.4.6 Human Engineering Program Plan

The program plan and test plan will be prepared in accordance with paragraph 3.3.7 of this specification.

3.4.7 Quality Assurance Plan

The Quality Assurance Plan will be prepared in accordance with paragraph 4.1.3 of this specification.

3.5 Logistics

This section will state that the equipment shall be designed to be supportable logistically as outlined in the JTIDS Joint Integrated Logistics Support Plan (JILSP). Information for this plan is "to be determined" for the EDM terminal.

3.5.1 Maintenance - EDM Terminal

The maintenance requirements for the EDM terminal will differ somewhat from those anticipated for the Production terminal since the EDM will be used primarily for operational test and evaluation. Supply and maintenance support will be furnished by the equipment contractor during the engineering development and testing phase of the JTIDS program.

3.5.1.1 Maintenance Concept

The maintenance concept for the EDM terminal will have "to be determined" by the Navy. It is assumed for the production terminal that the concepts will follow the direction implied by the existence of BITE in the terminal and that automatic test equipment will be available for fault correction at the intermediate and depot levels of repair.

The complexity of modules/PCBs designated for repair and subject to removal in the EDM because of component failures should be kept at a level such that repair can be accomplished at the user level by an electronic technician (ET-3). The capabilities of the average ET-3 within the Navy are outlined in NAVPERS manual 18068. If the complexity of the repair is beyond the capability of the ET-3, the contractor shall make recommendations on the next higher maintenance level for actions to be taken.

3.5.1.2 Maintenance Level Recommendations

The contractor will provide recommendations concerning the level of maintenance capable of repairing the EDM terminal in accordance with MIL-STD-1390. The location of the various maintenance levels within the Navy vary. Platforms such as carriers and cruisers usually have organizational and intermediate levels of maintenance. Other platforms have organizational maintenance only.

The skill levels at the maintenance levels of the Navy are as follows:

Maintenance Level	Skill Level
Organizational	ET-3, ETSN
Intermediate	ETC, ET-1, ET-2
Depot	Electronic Mechanic

The capabilities and limitations at the three maintenance levels are presented in Reference No. 11.

3.5.1.3 Organizational and Intermediate Task Description

The maintenance actions to be performed at these levels will have "to be determined" by the Navy with recommendations from the contractor of the EDM terminal.

3.5.1.4 Depot Task Description

The maintenance actions to be performed at the depot level for the EDM will have "to be determined" by the Navy with recommendation from the contractor.

3.5.1.5 Built-in Test Equipment

The EDM terminal will have a BITE capability. The fault defects detected by this BITE are to be determined by the contractor. This section on BITE will provide the details associated with functions performed (e.g.: automatic, manual) display characteristics (e.g.: go/no go), dependability (e.g.: percent level of detection). Information on BITE capabilities for the terminal is available in Reference Nos. 5, 6 and 7.

3.5.1.6 Test Measurement and Diagnostic Equipment (TMDE)

The terminal will be tested and calibrated using TMDE. The levels of usage for TMDE will have "to be determined".

3.5.1.6.1 Circuit Test Point Design Criteria. The terminal will be designed to have circuit test point access which is in compliance with the criteria presented in MIL-STD-415. The test point data will be prepared in accordance with MIL-STD-1345.

The tests to be performed which will require test points should be listed here. This information will have "to be determined" by the contractor.

3.5.1.6.2 System Signal Quality and Circuit Performance. This section should specify that the contractor will prepare test procedures for evaluating, monitoring and measuring signals into and out of the system and subassemblies of the terminal.

3.5.1.6.3 Calibration

3.5.1.6.3.1 Calibration Test Procedures. This paragraph will specify that the contractor will develop test procedures for use with TMDE and other calibration equipment for the terminal.

3.5.1.6.3.2 Instrument Calibration Procedures (ICP). This paragraph will address the preparation of ICPs for the terminal in accordance with MIL-M-38793 and MIL-M-38793/1A.

3.5.1.6.3.3 Calibration Design Criteria. This paragraph will address the requirements for built-in TMDE if any is provided for calibration of the terminal.

3.5.1.6.5 General Purpose Electronic Test Equipment (GPETE). The GPETE will be selected from MIL-STD-1364. If GPETE is not listed in MIL-STD-1364, request for use shall be made in writing in accordance with MIL-STD-1345.

3.5.1.6.6 Technical Manual Test Procedures. This paragraph will specify that test procedures for signal quality, circuit performance, calibration, alignment and LRU fault location will be included in the technical manual for the terminal. Also, test procedures for SRU maintenance shall be included into the depot overhaul and repair manuals.

3.5.1.6.7 Support Maintenance Test Procedures Verification. This paragraph will address the verification of procedures and techniques for maintenance and test personnel performing the test procedures at the equipment, PCB, module, etc. level.

3.5.1.6.8 Monitoring. This paragraph will specify the requirements for monitoring all inputs and outputs to each LRU and SRU with GPETE. Information on this will have "to be determined".

3.5.2 Supply

This subsection addresses the supply structure that will be used for supporting the terminal and will not apply to this specification.

3.5.3 Facilities and Facilities Equipment

The facilities and equipment for supporting the terminal will only be applicable to this specification for test equipment at the depot level. Details on this will have "to be determined".

3.6 Personnel and Training

This section does not apply to the production terminal specification. However, any training or personnel provided by the contractor for EDM operational testing will have "to be determined" and included in the specification.

3.7 Functional Area Characteristics

This section will present the requirements for the functional performance of the terminal. At the present time, the functions identified for the shipboard terminal are as follows:

3.7.1 Phase II Functions

a. Information Distribution
b. Relative Navigation
c. Identification
d. Subscriber Functions
e. Phase I Compatibility
f. Integrated Conventional CNI Functions
g. TACAN

The different subscriber functions need "to be determined" for inclusion in this portion of the specification. The subscribers are of three categories; integrated, transparent, and stand-alone.

For integrated subscribers, the JTIDS terminal interfaces directly with the hardware and software of the subscriber. The terminal performs all functions which are appropriate for the subscribers such as Relative Navigation, IFF and Information Distribution. The candidate integrated subscribers include aircraft avionics systems, and shipboard command and control systems. These are "to be determined" for the Navy. The transparent subscribers use the JTIDS data links without modifications to the link hardware and software. The transparent subscribers to be considered by the Navy are:

- TADIL A, TADIL B, AND TADIL C
- NATO Link 1
- MIL-STD-188-1-0 Digital Data Bit Streams

For the stand-alone subscribers, the terminal provides data processing and display capabilities matched to the operational requirement of the subscriber. Included in this group are special avionics, manpack and manual centers "to be determined".

Information on the subscriber requirements is presented in Reference No. 2. Paragraphs 3.1.7.2.2, 3.1.7.2.3 and 3.1.7.2.4 list potential subscribers of concern to the Navy.

The functions of the terminal are presented in the subsections that follow.

3.7.1.1 Information Distribution Function

The functional requirements for information distribution will be in this subsection.

3.7.1.1.1 Information Distribution Channel Structure

3.7.1.1.1.1 Channel Composition. This paragraph(s) will define the system architecture and the generation of the Meta-channel concept as a function of a contiguous stream of basic event intervals. The Basic, Composite, and Function channels and their relation to the Meta-channel will be identified and defined.

3.7.1.1.1.2 System Channelization. Based on operational requirements, the expected number of Meta-channels and the system architecture supporting the channelization, will be identified.

3.7.1.1.1.3 Generic Channel Access Types. Open and closed channel types will be distinguished by the operational rules established to permit subscribers to access a Function channel. An "open" and "closed" channel and operational limitations on each will be defined, and classification of Function channels by types of access afforded to the subscriber will be provided. The available types of access are:

a. Assigned Access Channel (AAC)
b. Command Access Channel (CAC)
c. Demand Access Channel (DAC)
d. Scheduled Access Channel (SAC)

The definition of each type of access channel will be provided.

3.7.1.1.1.4 Generic Channel Architecture Types. The system provides three generic composite channel architectures to satisfy the function channel designs. Message preambles are provided in five basic groupings of component signals. The three channel types will be identified and defined.

3.7.1.2 TACAN Function

The requirement for a TACAN transponder to be considered for the shipboard terminal is presented in Reference No. 20. Details on the functional requirements and operating characteristics for TACAN are found in Reference Nos. 1, 5, 6 and 7. The primary sections that need to be addressed for TACAN are as follows:

3.7.1.2.1 Channel Characteristics. The requirements for channel structure format, number of channels, interrogation frequencies, reply frequencies, pulse coding, reference group characteristics, reply delay and RF spectrum will be specified in this subsection.

3.7.1.2.2 Modes of Operation. The requirements for manual select, receive, T/R, Air to Air, Inverse, Airborne Beacon, Auto Mode and Degraded Modes will be specified in this subsection.

3.7.1.2.3 Functional Performance. The requirements for bearing, acquisition, accuracy, interference, distance and identity, will be specified in this subsection.

3.7.1.2.4 Traffic Capacity in A/A Mode. This subsection will specify the requirements for traffic capacity.

3.7.1.2.5 Performance Monitoring. The requirements for the TACAN monitor, TACAN self test, REC Mode, T/R mode, A/A mode and inteferring signals will be specified in this subsection.

3.7.1.2.6 Functional Priorities. This subsection will specify the requirements for allocation of terminal resources and priority selection.

3.7.1.3 Identification Function

The requirement for IFF to be considered for the shipboard terminal is presented in Reference No. 20. Details on the functional and operating requirements for IFF are found in Reference Nos. 1, 5, 6 and 7.

The primary sections that need to be addressed for IFF are as follows:

3.7.1.3.1 Channel Characteristics. This section will specify the channel structure format, number of channels, carrier frequencies, and interrogation frequencies.

3.7.1.3.2 Modes of Operation. The requirements for mode 1, mode 2, mode 3A, test mode, and pulse code will be specified in this subsection.

3.7.1.3.3 Functional Performance. The operation of the IFF equipment, interference characteristics, echo rejection, desensitization, triggering level, overall performance requirements, suppression characteristics, interrogation side lobe suppression, pulse width discrimination, transponder delay, and range jitter will be specified in this subsection.

3.1.7.3.4 Performance Monitoring. The requirements for the IFF monitor, and IFF self test will be specified in this subsection.

3.7.1.3.5 Functional Priorities. The priorities and priority selection will be presented in this subsection.

3.7.1.4 Digital Voice Function

The requirement for digital voice is established in Reference No. 2 as part of the Information Distribution function. Details on the Digital Voice function and operating requirements are presented in Reference Nos. 1, 2, 5, 6 and 7. The primary areas to consider for digital voice are as follows:

3.7.1.4.1 Channel Characteristics. The requirements for signal structure format and channel bit rate for both the Continous Variable Slope Delta Modulation (CVSD) and Linear Prediction Encoder (LPE) will be presented.

3.7.1.4.2 Modes of Operation. This subsection will specify the modes of operation for manual selection and automatic selection.

3.7.1.4.3 Functional Performance. The fidelity, LPE channel Bit Error Rate, CVSD output SNR, and access time will be specified.

3.7.1.5 JTIDS Phase I TDMA Digital Data Function

The requirement for TDMA digital data is presented in Reference No. 2. Details on this function are presented in Reference Nos. 1, 2, 5, 6 and 7. The primary items to consider for this function are as follows:

3.7.1.5.1 Channel Characteristics. This section will describe the channel structure format and specify the requirement to accommodate Mode 1 and waveform 2B of the Phase I communications structure. The allocation

of resources in the terminal between Phase 1 and Phase II will have "to be determined".

3.7.1.5.2 Modes of Operation. The requirements for the manual and automatic selection modes will be specified.

3.7.1.5.3 Functional Performance. This section will specify the requirements for Message Loss Rates of formatted messages under the conditions of barrage and optimum jamming described in Section 3.3.2.2.

3.7.1.6 Relative Navigation Function

The requirement for Relative Navigation to be included in the terminal is specified in Reference No. 2. Details on the functional requirements and operating characteristics for Relative Navigation are provided in Reference Nos. 5, 6, 7, 21 and 22. The primary characteristics for this function are as follows.

3.7.1.6.1 Time of Arrival Measurement Accuracy. The requirements for net acquisition, initial net entry, active fine net synchronization, and round trip timing net synchronization will be specified.

3.7.1.7 Link 4 Function

The requirement for the Link 4 function is specified in Reference No. 2. Details on the characteristics of Link 4 are presented in Reference Nos. 5, 6, 7 and 18. The primary characteristics for this function will include the following.

3.7.1.7.1 Channel Characteristics.

3.7.1.7.1.1 Channel Message Rate. The channel shall permit the transmission of a Link 4 control message or reply message -- (data content in bits, frequency of occurrence and message data rate will be specified).

3.7.1.7.1.2 Modes of Operation

3.7.1.7.1.2.1 Two-Way Transmission. Message characteristics, clock source, and message structure will be specified.

3.7.1.7.1.2.2 One-Way Transmission. Similar specifications for one-way transmission of a Link 4 control message will be provided.

3.7.1.7.1.2.3 Functional Performance

3.7.1.7.1.2.3.1 Message Loss Rate. The performance for this characteristic shall be specified.

3.7.1.7.1.3.2 Time-of Arrival Measurement Accuracy. The requirements for TOA will be specified.

3.7.1.7.1.2.3 Initial Net Entry. The initial Net Entry process shall be specified.

3.7.1.7.1.3.4 Fine Net Synchronization. Fine net synchronization shall be specified.

3.7.1.8 Link 11 Function

The requirements for the Link 11 function is specified in Reference 2. Details on the characteristics of this link are presented in Reference Nos. 5, 6 and 7 and 18. Primary characteristics to consider for Link 11 are as follows:

3.7.1.8.1 Channel Characteristics

3.7.1.8.1.1 Channel Message Rate. The expected message rates must be specified. In addition, the interface constraints documented in para. 60.5.2. 6.1 of Reference 2 should be identified.

3.7.1.8.2 Modes of Operation

3.7.1.8.2.1 Roll-Call Mode. The three types of message formats available in the Roll-Call mode will be identified. The channel design characteristics will be specified.

3.7.1.8.2.2 Broadcast Channel Mode. The characteristics of the Broadcast Channel design and the operational considerations relating to structure will be specified.

3.7.1.8.3 Functional Performance

3.7.1.8.3.1 Message Loss Rate. Details on this are "to be determined".

3.7.1.8.3.2 TOA Measurement Accuracy. The performance shall be specified.

3.7.1.8.3.3 Initial Net Entry. The initial Net Entry process shall be specified.

3.7.1.8.3.4 Fine Net Synchronization. Fine net synchronization shall be specified.

3.7.1.9 Independent Nets Low Data Rate DTDMA

The low data rate DTDMA channel provides duplex operation by permitting multiple, simultaneous, dispersed transmissions of messages on a set of closed channels. A single, low data rate channel is comprised of eight basic channels and is capable of supporting an encoded information rate of 2400 bps. This data rate may be used for LPE digital voice functions or digital data links, such as TADIL B, NATO Link 1, etc. The system architecture of the channel, message preamble, probable applications, and timing information shall be specified here.

3.7.1.9.1 Channel Message Rate. Details are "to be determined".

3.7.1.9.2 Mode of Operation. Details are "to be determined".

3.7.1.9.3 Functional Performance. Details are "to be determined".

3.7.1.9.3.1 Message Loss Rate. Details are "to be determined".

3.7.1.9.4 TOA Measurement Accuracy. The need for this function is "to be determined". If required, the performance shall be specified.

3.7.1.10 Other Subscriber Functions

Functions that are to be performed by the terminal for subscribers not covered in this Section of the specification will have "to be determined". The information required will be similar to the paragraphs described in this section.

3.7.10.1 Integrated CNI Functions. The functions for TACAN and IFF are covered in this section. It is anticipated that a study will have to be performed by the Navy to determine the effectiveness in terms of cost and mission performance that will occur if these functions are integrated into the shipboard terminal.

3.8 Precedence of Documents

This section will contain a statement regarding the precedence of documents when contract requirements are in conflict. Usually, the contract has precedence over the specification. Thereafter, this specification will have precedence over all other subsidiary specifications and any reference specification will have precedence over all subsidiary specifications.

4.0 QUALITY ASSURANCE PROVISIONS

4.1 General

This section will specify the requirements and criteria for verification of the JTIDS performance and design characteristics presented in Section 3.0 of this specification. Although no verification requirements exist for this terminal, examples of verification requirements are presented in Reference No. 2 for a TDMA system.

4.1.1 Responsibility for Inspection

This subsection will state that the terminal contractor is responsible for the performance of all inspections. It will also specify the required facilities and the right of the Government to perform any inspections deemed necessary to assure that the terminal conforms to the prescribed requirements.

4.1.2 Special Tests and Examinations

This subsection does not apply to the JTIDS terminal specification

4.1.3 Quality Program Requirement

The Quality Program will be in accordance to MIL-Q-9858. A quality assurance plan will be prepared by the contractor that addresses the specific features and requirements of the EDM terminal.

4.1.4 Government Verification

Verification consists of the following:

a. Surveillance of the quality assurance operation
b. Government inspection to assure compliance of offered products.
c. Government inspection to assure compliance of delivered products.

Information on any of the above items can be found in MIL-Q-9858.

4.1.5 Test Procedures

The suppliers of the terminal will develop written test procedures for all tests deemed necessary to demonstrate compliance with the specification and subsidiary specifications. Each test shall be identified in accordance with paragraph 4.1.6 of this specification.

4.1.5.1 Test Equipment

Each test procedure will contain a list of test equipment identified by name, manufacturer and model. Special test equipment will be tested and identified.

4.1.5.2 Data Sheets

Data sheets will be prepared and included with the test procedures showing parameters, limits, etc.

4.1.6 Classification of Inspection

The quality examinations and testing of the terminal are within the following classification:

a. First Article Inspection
b. Quality Conformance Inspection
    1. Product inspection
    2. Product control inspection
    3. Inspection of preparation for delivery
c. Reliability Testing
d. Maintainability Testing

4.1.7 First Article Inspection

This subsection will present the tests necessary to determine compliance with the requirements of this specification. Examples of first article tests are:

Burn-In, humidity, salt spray, EMI, temperature shock, vibration, production inspection and inclination

The specific tests to be performed on the EDM terminal will have "to be determined" by the contractor. Examples of tests to be performed on JTIDS terminals are presented in Reference No. 12.

4.1.7.1 First Article Inspection Report

This paragraph will state that a report will be prepared containing all the results of the first article inspection and submitted to the procuring agency for review and approval.

4.1.7.2 First Article Approval

This paragraph will state that approval will be furnished in writing by the procuring agency.

4.2 Quality Conformance Inspection

4.2.1 Production Inspection

This inspection will cover the EDM terminal as well as production terminals. Typical inspections include surface examination and operating test.

4.2.1.1 Surface Examination

The requirements of workmanship in Requirement 9 of MIL-STD-454 are of concern as well as others such as materials, finish, safety and corrosion resistance.

4.2.1.2 Operating Test

This paragraph will be concerned with energizing the terminal for operation to ensure that it functions in accordance with Section 3 of this specification.

4.2.2 Production Control Inspection

This section is concerned with sampling procedures and inspection as defined in MIL-STD-105. Production control inspections have been noted at an AQL of 6.5 percent for other NAVELEX shipboard electronic systems. (Reference No. 13 and 14).

4.2.2.1 Rejected Lots

This paragraph will address the action to be taken for rejected lots.

4.2.2.2 Reinspection of Conforming Production Control Test Units

This paragraph will address the acceptance of sample units that have been repaired and reinspected.

4.3 Reliability Test

4.3.1 Reliability Test Plan

This will state the requirement for the contractor to develop reliability test plans and procedures for reliability testing.

4.3.1.1 Test Performance

This paragraph covers areas such as the following:

a. Tests are to be performed with the terminal in a shipboard configuration with other systems.

b. Contractor supplying cables, connectors, test instruments, etc.

Information on the above is presented in Reference No. 13.

4.4 Screening Test

This section will specify that a screening test will be performed on the terminal. The following will be included under this section.

4.4.1 Screening Test Procedures

4.4.1.1 Screening Test Failures

4.4.1.2 Screening Test Reports

Reports will be provided to include a plot in accordance with the acceptance criteria defined in MIL-STD-109.

4.4.2 Reliability Testing

Reliability Testing will be done in accordance with the test plans of MIL-STD-781 and include the following:

4.4.2.1 Shipboard Reliability Test

4.4.2.2 Test Details

4.4.2.3 Failure

4.4.2.4 Rejection

4.4.2.5 Final Restoration and Disposition of Test Equipment

4.4.3 Reliability Test Reports

This subsection establishes the requirement for the contractor to prepare a report on the results of the reliability testing.

4.5 Maintainability Demonstration

This section will address the system maintainability requirements, and specify that they be demonstrated in accordance with MIL-STD-471. The critical areas for demonstration include: MTTR, direct maintenance manhours, maintenance and repair cycles, service and access, fault detection and isolation, and maintenance personnel requirements.

4.5.1 Maintainability Demonstration Test Plan

This subsection will specify the requirement for a plan to be detailed in accordance with MIL-STD-471 to demonstrate the maintainability of the terminal at all levels (organizational, intermediate and depot).

4.5.2 Support Maintenance Requirements

For this section, consideration should be given to the following areas which are identified in Reference No. 13:

4.5.2.1 Procedures and Techniques

4.5.2.2 Test Personnel

4.5.2.3 Test Procedures

4.5.2.4 Test Equipment

4.5.2.5 Test Jigs and Tools

4.5.2.6 Boards and Modules

4.5.2.7 Depot and Intermediate Level Tests

4.5.2.8 Organizational Level Tests

4.5.3 Environmental Conditions

Maintenance will be demonstrated under certain environmental conditions such as a specified level of humidity.

5.0 PREPARATION FOR DELIVERY

This section will address the requirements that must be satisfied to achieve packaging and delivery of the terminal. The primary requirements for this are to be found in MIL-STD-794 and MIL-E-17555.

6.0 NOTES

This section of the specification will contain information as follows:

6.1 Intended Use

6.2 Ordering Data

6.2.1 Procurement Requirements

6.2.2 Contract Data Requirements

6.3 First Article Approval

6.4 Definitions

6.4.1 Terms (Specifications)

6.4.2 Levels of Maintenance Descriptions

6.4.3 Other Information Which Is Not Contractually Binding and Can Serve As Background Information

10.0 APPENDICES

This portion of the specification should contain requirements which are contractually a part of the specification, but for convenience are incorporated in an appendix.

10.1 JTIDS/NTDS Electrical Interface Requirements

10.2 Terminal Interfaces

10.3 JTIDS Messages

APPENDIX A

Documented Data Sources and Personal Data Sources

DOCUMENT DATA SOURCES

#1 Specification for Advanced Development Model - Joint Tactical Information Distribution System, Phase II, Naval Air Development Center
22 July 1975
Doc. #60P2-PS-7502
Secret

#2 System Specification for JTIDS Joint Program Office; Deputy for Control and Communications Systems. Electronic Systems Division (AFSC), Hanscomb AFB, Mass.
Specification Number DCB 7650000
May 1977 Code Ident. 50464
Secret

#3 Joint Operational Requirements for the Joint Tactical Information Distribution System (JTIDS)
Confidential

#4 Program Management Directive #80 for Joint Tactical Information Distribution System (JTIDS), Office of the Director of Defense Research and Engineering
25 June 1976

#5 Joint Tactical Information Distribution System Phase II Advanced Development Evaluation. Final Report for Phase II January 1977
Volume I, ITT Avionics Division
Secret

#6 Joint Tactical Information Distribution System Phase II Advanced Development Evaluation. Final Report for Phase II
January 1977 Volume II
ITT Avionics Division
Secret

#7 Joint Tactical Information Distribution System Phase II Advanced Development Evaluation. Final Report for Phase II.
January 1977 Volume III
ITT Avionics Division
Secret

#8 Design Guidelines for a JTIDS Shipboard Terminal: Packaging, form and fit, and military specification and standards. Task 001. Prepared by Rockwell International, Collins Government Telecommunication Division,
4 November 1977

#9 JTIDS F-TOSS AN/ARC-181 Communications Terminal, System Segment Specification, SS10042
12 October 1976
Department of the Air Force

#10 C V Platform Interface Design Specification. Prepared by ITT Avionics, Nuthy, New Jersey.

#11 MIL-STD-1369. Integrated Logistics Support Program Requirements, NAVELEX

#12 Test Requirements Document, Volumes 1 and 2 prepared by Naval Air Development Center, 60P2 - JTIDS Project Office

#13 Naval Electronic Systems Command Contract Specification for a Receiving Set, Satellite Signal AN/SSR-1 ELEXR-149
21 May 1973

#14 System Specification No. 975623 UHF Communication AN/URQ-19(V)
Prepared for Naval Electronics Systems Command
Code Ident. 12813
13 August 1973

#15 Computer Program Test Plan, JTIDS Phase II Advanced Development Evaluation; Prepared for NADC by ITT Avionics Division
15 December 1976

#16 JTIDS Task 1 Report, Volume I, II, III, Advanced Development Evaluation; Prepared for NADC by ITT Avionics Division
May 1976

#17 Technical Response and Clarification Volume I, JTIDS - DTDMA Class II Tactical Terminal
August 1977
Prepared by ITT Avionics

#18 System Laboratory Test Specification for JTIDS, Prepared by Code 733 of NOSC
27 May 1977

#19 JTIDS Interface Design Specification, Prepared under Contract N62269-76-C-0537 for the JTIDS Joint Program Office
19 November 1976

#20 OpNAV Instruction 3510.Xx
Subject: JTIDS Policy
December 1977

#21 System Organization, Performance and Protocal for the Relative Navigation Capability of JTIDS, Phase I, NADC
14 January 1977
Specification No. 60P2-PS-7701

#22 Specification 60P2-8S-7605, Revision A, 29 September 1977
Relative Navigation Interface Between JTIDS and AN/ASN-91 Weapon Delivery Counter

#23 Computer Program Design Specification for JTIDS Phase II, ITT Avionics, Volumes I and II

PERSONAL DATA SOURCES

E. Smith	NADC
J. Bevins	NADC
C. Haught	NADC
P. Finnegan	NADC
P. Jackson	NADC
LCR. B. Hull	NAVSEA
T. Reynolds	NAVSEA
D. Clapp	JTIDS JPO
R. Babon	JTIDS JPO
L. Zavodil	JTIDS JPO
S. Zikas	JTIDS JPO
LCR W. King	NAVELEX
T. Shapard	NOSC
A. Wunsch	NOSC